of parotid saliva. But if the two secretory nerves (cerebral and sympathetic) are simultaneously excited, the percentage of organic matter increases considerably, both in the dog and rabbit. This could not have been the result of the anæmia due to sympathetic excitation, since no such effect was observed by interrupting the blood supply of the gland.

As H. had previously shown, the microscopic appearance of gland cells is altered by a long-continued nerve excitation. This change is slight after excitation of the cerebral nerve, but more considerable and somewhat different after stimulation of the sympathetic, although the latter nerve, when stimulated alone, does not produce any parotid secretion whatever.

In conclusion, H. maintains the theory that there exist secretory nerves influencing the secretion of water and salts, and trophic fibres governing the secretion of organic matter. The former fibres predominate in the cerebral gland nerves; the latter are mostly contained in the sympathetic salivary nerves.

SOME entirely new facts as regards the innervation of the submaxillary gland, have been found by J. N. Langley (*Journal of Phys.*, Vol. I., No. 1, p. 96), in the cat, an animal not yet examined in this respect. In the dog, as is well known, the saliva normally obtained by stimulation of the sympathetic nerve, is extremely viscid, containing much mucin; whilst that obtained by stimulation of the chorda tympani is more or less watery, containing a much less quantity of mucin. In the cat, however, the sympathetic saliva is less viscid than the chorda saliva. In dogs the chorda is paralyzed by a small quantity of atropia, but the sympathetic not at all (or only by excessive doses.—Langley). In the cat, on the other hand, the two nerves are almost alike in their susceptibility to the paralytic effects of atropia. In the dog, simultaneous stimulation of both nerves checks the secretion, the two nerves being apparently antagonistic to each other; but in the cat, minimal effective stimuli, when applied simultaneously to the chorda and sympathetic nerves, are not antagonistic, as regards secretion; on the contrary, the amount of secretion from the simultaneous stimulation is at least equal to the sum of the amounts from separate stimulation. The effect of stimulation of either nerve is even increased by faradizing the other nerve with a current by itself insufficient to provoke secretion. Only when both nerves are simultaneously exposed to *very strong* currents, the amount of secretion which the chorda alone can produce is somewhat lessened by the action of the sympathetic, probably from its influence on the vessels of the gland.

These researches were continued by Langley in a subsequent number (Vol. I., Nos. 4 and 5, p. 332) of the *Journal of Physiology* and extended to the antagonism of atropin and pilocarpin on the submaxillary gland of the cat. We can mention his principal results partly in his own words.

An exceedingly small quantity of pilocarpin, 0.001 gram., will call forth a lively secretion of saliva. A few minutes after the beginning of the secretion so produced, stimulation of the chorda causes an increase in the flow, which is much less than the flow caused by equal chorda stimulation previous to the pilocarpin injection. The effect of stimulating the sympathetic is in like manner diminished, but proportionately less.

After successive large pilocarpin doses there occurs a long continuing condition in which stimulation of the sympathetic causes no increase, but only a decrease of the secretion, more and more marked (in certain limits) with the increase in the strength of the stimuli and the time during which the stimuli are applied, and in which stimulation of the chorda causes a very slight increase in the secretion, rather more marked with the stronger stimuli. If a very large quantity of pilocarpin is brought into the gland either by direct injection into the gland (lingual) artery or into the gland duct, the secretion ceases at once, and the nerves are paralyzed for some time.

Atropin, in sufficient quantity, produces a complete stoppage of secretion and paralysis of the secretory nerves even after a previous dose of pilocarpin. The atropin effect can, however, be completely overcome by a subsequent injection of pilocarpin into the gland artery or duct. This mutual antagonism can be repeatedly shown, but is each time less perfect as far as the action of pilocarpin is concerned.

By stimulating either chorda or sympathetic (electrically) and causing a secretion, the atropin paralysis of these nerves, but especially of the sympathetic (which normally is less affected by atropin than the chorda), is more readily brought about. The atropin paralysis is also more readily effected after prolonged pilocarpin secretion, but after pilocarpin a somewhat larger dose of atropin is required to paralyze the chorda than is normally the case. There are two factors then to be considered in the paralysis: the amount of pilocarpin—this causes the atropin to produce its effects less readily,—and the amount of saliva secreted, which enables the atropin to produce its effects more readily.

The diminution of sympathetic effect produced by pilocarpin is unaffected by a small dose of atropin, unless some amount of secretion has taken place, but in the latter case the parts which the atropin attacks, be they nerve endings or gland cells, are more readily attacked by atropin, and an atropin paralysis adds itself to the pilocarpin diminution of sympathetic effect. But although pilocarpin in comparatively small quantity, when producing a secretion tends to paralyze the sympathetic, yet it but slightly affects it if a small amount of atropin (not enough by itself to paralyze that nerve) be given previously or at the same time.

As general conclusions, Langley adds:

Pilocarpin, in proportion to the quantity given, paralyzes both the chorda and sympathetic secretory fibres.

The diminution of the pilocarpin secretion caused by stimulating the sympathetic, is a direct effect of diminished blood supply, and not of nerve fibres inhibitory to the secretion.

The slight increase of saliva obtained by stimulating the chorda after a large dose of pilocarpin, is due, not to the action of its secretory, but of its vaso-dilator fibres. H. G.

NERVE DEGENERATION.—Notwithstanding the large number of researches on this subject, Dr. Th. Rumpf (*Unters. aus d. Phys. Institut d. Univ. Heidelberg*, II., 3, p. 307) undertook an investigation on the changes in divided